

S/N 09/829,749

Docket: FIS920010045US1

**IN THE CLAIMS:****Please revise the claims as follows:**

1. (Currently amended) An electronic circuit wiring interconnect package test and repair apparatus, comprising:

~~at least one~~ a wiring analyzer to locate shorts between conductors, said conductors being on a surface of or embedded in a carrier substrate, said conductors being intended to interconnect components to be mounted on said carrier substrate to form a circuit, said carrier substrate being devoid of all said components, wherein said wiring analyzer is a selected one of a first wiring analyzer having a first speed of operation and a second wiring analyzer having a second speed of operation;

a current source to provide current sufficient to remove said shorts; and

a cluster probe, comprising a plurality of probes, to contact said conductors in a manner controlled by said wiring analyzer.

2. (Currently amended) The test and repair apparatus of claim 1, wherein said ~~at least one~~ first wiring analyzer comprises at least one a relay wiring analyzer and at least one said second wiring analyzer comprises a solid state wiring analyzer, thereby providing at least two different testing speeds.

3. (Previously presented) The test and repair apparatus of claim 1, further comprising a controller for automatic positioning of said cluster probe.

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S/N 09/829,749

Docket: FIS920010045US1

5. (Original Claim) The test and repair apparatus of claim 1, further comprising a controller having voltage stress test capability.

6. (Previously presented) The test and repair apparatus of claim 1, further comprising a controller to automate at least one of said locating of said shorts and said removing of said located shorts.

7. (Previously presented) The test and repair apparatus of claim 1, wherein said at least one wiring analyzer additionally locates open circuits that are defects in said carrier substrate.

8. (Original Claim) The test and repair apparatus of claim 6, wherein said controller performs a plurality of attempts to remove said shorts.

9. (Currently amended) A method of testing and repair of wiring interconnect packages, comprising:

contacting, at a predetermined set of locations, a wiring interconnect package under test, using a cluster probe containing a plurality of probes;

applying a predetermined set of voltage levels in a predetermined sequence to predetermined probes in said cluster probe;

measuring a response to each application of voltages to detect any abnormal open or short in said wiring interconnect package; and

S/N 09/829,749

Docket: FIS920010045US1

for any detected abnormal short, applying a predetermined current to attempt to remove said detected abnormal short,

wherein said applying of current to attempt to remove said detected abnormal short and said measuring of a response to detect any abnormal open or short uses a same apparatus and said apparatus uses a selected one of two wiring analyzers for said applying a predetermined set of voltage levels and said measuring a response to each application of voltages, a first of said two wiring analyzers operating at a higher speed than a second of said two wiring analyzers.

10. (Previously presented) The method of claim 9 wherein at least one of the following is automated:

said contacting at a predetermined set of locations;

said detecting of abnormal open or short; and

said attempting to remove said detected abnormal short.

11. (Currently amended) A method of automatically testing and repairing wiring interconnect packages, said method comprising:

selecting one of a high-speed wiring analyzer and a lower-speed wiring analyzer on a test apparatus having both a test capability and a repair capability;

contacting, at a predetermined set of locations, a wiring interconnect package under test, using a cluster probe containing a plurality of probes;

automatically applying a predetermined set of voltage levels in a predetermined sequence to predetermined probes in said cluster probe;

S/N 09/829,749

Docket: FIS920010045US1

automatically measuring a response to each application of voltages to detect any abnormal open or short circuits in said wiring interconnect package; and

for a detected abnormal short circuit, automatically applying a predetermined current to attempt to remove said detected abnormal short circuit.

12. (Previously presented) The method of claim 11, wherein said detecting of any abnormal opens or shorts is executed at a first higher speed using a solid state switching module and said attempting to remove shorts is executed using a relay switching module.

13. (Previously presented) The method of claim 11, wherein said contacting of said wiring interconnect package is additionally automatically actuated by a controller.

14. (Currently Amended) An apparatus for testing and repair of wiring interconnect packages, comprising:

~~at least one~~ a wiring analyzer to locate abnormal shorts between conductors, said conductors being on a surface of or embedded in a wiring interconnect package, said conductors being intended to interconnect components to be mounted on said wiring interconnect package to form a circuit, said wiring interconnect package being devoid of all said components, said wiring analyzer being a selected one of two wiring analyzers, a first of said two wiring analyzers operating at a slower speed than a second of said two wiring analyzers;

a current source to provide current sufficient to remove said abnormal shorts; and

S/N 09/829,749

Docket: FIS920010045US1

a cluster probe to contact predetermined locations on said wiring interconnect package.

15. (Currently amended) The test and repair apparatus of claim 14, wherein said ~~at least one~~ first wiring analyzer comprises ~~at least one~~ a relay wiring analyzer and ~~at least one~~ said second wiring analyzer comprises a solid state wiring analyzer, ~~thereby providing at least two different testing speeds.~~

16. (Original Claim) The test and repair apparatus of claim 14, further comprising a controller to automatically position said cluster probe.

17. (Original Claim) The test and repair apparatus of claim 14, further comprising a controller for a voltage stress test capability.

18. (Previously presented) The test and repair apparatus of claim 14, further comprising:  
a controller so that at least one of locating of said abnormal shorts and removing of said abnormal shorts is automated.

19. (Currently amended) A signal-bearing medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to perform a method of testing and repair of wiring interconnect packages, said method comprising:  
receiving an input indicating whether a testing is to be executed by a first wiring analyzer or a second wiring analyzer;

S/N 09/829,749

Docket: FIS920010045US1

contacting, at a predetermined set of locations, a wiring interconnect package under test, using a cluster probe containing a plurality of probes;

applying a predetermined set of voltage levels in a predetermined sequence to predetermined probes in said cluster probe;

measuring a response to each application of voltages to detect any abnormal opens or shorts in said wiring interconnect package; and

for a detected short between conductors, applying a predetermined current to attempt to remove said detected short, said conductors being on a surface of or embedded in said wiring interconnect package, said conductors being intended to interconnect components to be mounted on said wiring interconnect package to form an electronic circuit, said wiring interconnect package being devoid of all said components,

wherein said applying of voltages and said measuring of responses to detect any abnormal shorts uses a same apparatus that is used for said attempt to remove said shorts and said apparatus incorporates a first wiring analyzer and a second wiring analyzer, wherein said first wiring analyzer operates at a speed different from a speed that said second wiring analyzer operates.

20. (Previously presented) The apparatus of claim 1, further comprising:

a controller to control said wiring analyzer and to control said current source,

wherein said controller controls said wiring analyzer to perform an analysis of all said conductors contacted by said cluster probe prior to attempting to remove any located short circuit and said attempt to remove short circuit occurs without moving said cluster probe.

S/N 09/829,749

Docket: FIS920010045US1

21. (Previously presented) The apparatus of claim 20, wherein, after attempting to remove said located short circuits and prior to moving said cluster probe, said controller thereafter uses said at least one wiring analyzer to again locate abnormal shorts between said plurality of conductors.

22. (Previously amended) The apparatus of claim 5, wherein said voltage stress test is executed prior to moving said cluster probe, and, prior to moving said cluster probe, said controller uses said at least one wiring analyzer to again locate shorts between said plurality of conductors.